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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,571	07/25/2003	Susan J. Drapeau	4002-3473	9546

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Charles R. Reeves
Woodard, Emhardt, Moriarty, McNett & Henry LLP
Bank One Center/Tower
111 Monument Circle, Suite 3700
Indianapolis, IN 46204-5137

EXAMINER	
ROOKE, AGNES BEATA	
ART UNIT	PAPER NUMBER
1653	

DATE MAILED: 01/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/626,571	DRAPEAU ET AL.	
	Examiner	Art Unit	
	Agnes B Rooke	1653	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31 and 49-57* is/are pending in the application.

4a) Of the above claim(s) *32-48* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31 and 49-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *none*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This is in response to the Applicants election of Group I, Claims 1-31 and 49-57 with traverse, on November 26, 2004. Claims 1-31 and 49-57 are pending. Applicants' traversal is fully considered, however not found persuasive because search of additional Groups II and III would cause an undue burden for the examiner. Claims 32-48 were not examined.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 USC 103(c) and potential 35 USC 102(e), (f) or (g) prior art under 35 USC 103(a).

Claims 1-17, 19-23, 26-28, 31, 49-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sybert et al. (US 2002/0107570 A1).

Sybert et al. teach the use of demineralized bone for repair of spinal disorders. At [0051] Sybert et al. state that the mechanical strength of demineralized bone (herein after referred to as DBM) can be increased by forming chemical linkages between adjacent bone particles by exposing collagen on adjacent bone particles and forming collagen-collagen bonds. At [0042] Sybert et al. state that acid is used to demineralize bone. Sybert et al. state that chemical crosslinkages can be made using irradiation including photooxidation, UV light, microwave, and the like [0052, 0058], dehydrothermal treatment [0052, 0059], enzymatic treatment [0052] including the use of transaminase [0057], glutaraldehyde [0054], formaldehyde [0054], and dicyclohexyl carbodiimide and its derivatives [0054], polyethylene glycol dicycidal ethers [0054], and epsilon amino lysines [0053].

It would have been obvious to a person having ordinary skill in the art to make a composition comprising crosslinked DBM and collagen because Sybert et al. state that the mechanical strength of DBM can be increased by forming chemical linkages between adjacent bone particles by exposing collagen on adjacent bone particles and forming collagen-collagen bonds.

It would have been obvious to use carbodiimde (Claims 2, 49) derivatives such as N-(3-dimethylaminopropyl) N-ethylcarbodiimide hydrochloride (Claim 3)

and N- hydroxysuccinimide (Claim 4) to perform the crosslinking because Sybert et al. states that carbodiimide derivatives are useful for crosslinking collagens.

It would have been obvious to use glutaraldehyde, formaldehyde/formalin, and, polyethylene glycol dicycidal ethers such as 1,4-butanedoil diglycidyl ether (Claim 13) to perform the crosslinking because Sybert et al. states that these agents are useful for crosslinking collagens.

It would have been obvious to use irradiation including photooxidation, UV light, microwave, and the like (Claims 14, 15, 21, and 22) to perform the crosslinking because Sybert et al. states that these agents are useful for crosslinking collagens.

It would have been obvious to use an enzymatic treatment (Claim 16) such as the use of transaminase (Claim 17) to perform the crosslinking because Sybert et al. states that these agents are useful for crosslinking collagens.

It would have been obvious to use dehydrothermal treatment (Claim 19) to perform the crosslinking because Sybert et al. states that this method is useful for crosslinking collagens.

It would have been obvious to use epsilon amino lysines such as epsilon (gamma glutamyl) lysine (Claim 31) to perform the crosslinking because Sybert et al. states that these agents are useful for crosslinking collagens.

It would have been obvious that all crosslinking reactions would be performed under acidic conditions because Sybert et al. teach that acid is used to demineralize bone (Claim 20).

To accelerate new bone growth and bone healing, Sybert et al. state that growth factors and cementum attachment extracts can be incorporated in, or associated with the DBM [0060, 0062]. Therefore, it would have been obvious to a person having ordinary skill in the art to make a composition comprising crosslinked DBM and collagen and growth factors and cell attachment fragments (Claim 5, 26, 50) because Sybert et al. state that the addition of growth factors will accelerate new bone growth and bone healing. These growth factors and cell attachment fragments may or may not be attached to DBM (Claims 27, 28).

To facilitate bone growth, Sybert et al. state that various types of anterior supporting structures have been employed in intervertebral spinal fusion, i.e. spacers [0082]. Therefore, it would have been obvious to a person having ordinary skill in the art to make a composition comprising crosslinked DBM and collagen and spacers (Claim 23) because Sybert et al. state that the addition of spacer will facilitate bone growth and regeneration.

Claims 6, 7, 51, and 52 are being included in this rejection because Sybert et al. state at DBM is less than 1 to at least 90 weight % at [0040].

Claims 8, 9, 10, 11, 12, and 53-57 are being included in this rejection because the DBM comprises collagen and is therefore dispersed in collagen. Collagen is a scaffold protein, and the particle size of DBM is an inherent property produced by the method.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sybert et al. as applied to Claims 1 and 16 above, and further in view of Simpson et al. (US 2002/0090725 A1).

The teachings of Sybert et al. are discussed above. Sybert et al. do not teach to crosslink DBM and collagen using lysyl oxidase.

Simpson et al. teach that collagens are routinely crosslinked with lysyl oxidase [0185].

Therefore, it would have been obvious for a person of ordinary skill in the art to crosslink the DBM and collagen of Sybert et al. using the lysyl oxidase of Simpson et al. because Simpson et al. teach that it is routine to cross link collagens with lysyl oxidase and Sybert et al. teach that it is beneficial to expose collagens in DBM and crosslink them to increase the mechanical strength of DBM.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sybert et al. as applied to Claim 1 above, and further in view of Fang et al. (US 5,869,527).

The teachings of Sybert et al. are discussed above. Sybert et al. do not teach to crosslink DBM and collagen by glycation or glycosylation.

Fang et al. teach that collagens are routinely crosslinked by glycation or glycosylation. Column 1, line 21-23.

Therefore, it would have been obvious for a person of ordinary skill in the art to cross link the DBM and collagen of Sybert et al. by glycation or

glycosylation of Fang et al. because Fang et al. teach that it is routine to cross link collagens by glycation or glycosylation and Sybert et al. teach that it is beneficial to expose collagens in DBM and crosslink them to increase the mechanical strength of DBM.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sybert et al. as applied to Claim 1 above, and further in view of Bucala et al. (US 5,811,401).

The teachings of Sybert et al. are discussed above. Sybert et al. do not teach the DBM and collagen composition wherein the crosslinks are pentosidine crosslinks.

Bucala et al. teach that fluorescent crosslink pentosidine was isolated from human dura collagen, and that intramolecular pentosidine crosslinking can decrease solubility of structural proteins such as collagen, and trap serum proteins, such as lipoproteins to structural proteins such as collagen. See column 6, line 37-44.

Therefore, it would have been obvious for a person of ordinary skill in the art to cross link the DBM and collagen of Sybert et al. via intramolecular pentosidine crosslinks of Bucala et al. because Bucala et al. teach that intramolecular pentosidine crosslinking can decrease solubility of structural proteins such as collagen and Sybert et al. teach that it is beneficial to expose collagens in DBM and crosslink them to increase the mechanical strength of DBM.

Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sybert et al. as applied to Claim 1 above, and further in view of Chilkoti et al. (US 6,444,254).

The teachings of Sybert et al. are discussed above. Sybert et al. do not teach polyoxyalkyleneamine spacer or polyethylene glycol spacer in a composition of DBM and collagen.

Chilkoti et al. teach that different kinds of spacers, for example polyethylene glycol spacer that can be used in different compositions as an attachment to ligands or other structures. See column 7, line 38.

Therefore, it would have been obvious for a person of ordinary skill in the to use spacers in a composition of DBM and collagen of Sybert et al., and particularly polyethylene glycol spacer of Chilkoti et al. because Chilcoti et al. teach that it is routine to use spacers such as polyethylene glycol in different compositions.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sybert et al. as applied to Claim 1 above, and further in view of Boyce et al. (US 6,294,041).

The teachings of Sybert et al. are discussed above. Sybert et al. do not teach nonbioabsorbable material, such as methyl methacrylate, in a composition with DBM and collagen.

Boyce et al. teach osteoimplant composed of DBM, collagen, and methyl methacrylate as a reinforcing component in osteoimplant. Column 4, line 35.

Therefore, it would have been obvious for a person of ordinary skill in the art to make a composition of DBM and collagen of Sybert et al. with methyl methacrylate of Boyce et al. because Boyce et al. teach that it is routine to use methyl methacrylate to enforce the structure of the bone implant, composed of DBM and collagen.

Conclusion

No Claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Agnes Rooke whose telephone number is 571-272-2055. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jon Weber can be reached on 571-272-0925. The fax phone number for the organization where this application or proceeding is assigned is 571-272-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information about the PAIR system, see http://pair-direct.uspto.gov. Should you have any questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197.

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KAREN COCHRANE CARLSON, PH.D
PRIMARY EXAMINER